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STATUS OF THE GMI 3-D CORE MODEL CHEMISTRY BENCHMARK

Douglas E. Kinnison, Peter S. Connell, and Douglas A. Rotman
Lawrence Livermore National Laboratory
Livermore CA
and
GMI Science Team
(kinnison1@llnl.gov)

Abstract

A chemistry benchmark was developed to assist in the evaluation of several numerically efficient chemical solution approaches slated for use in the AEAP Global Model Initiative (GMI) assessment model. Because of the large computational requirements for a 3-D HSCT assessment, simplifications and approximations have been made in these numerical chemical solution approaches. This benchmark is an initial attempt to understand the implications of these simplifications and assumptions. The chemical mechanism for this benchmark was agreed on by the GMI science team. This mechanism represents a relatively complete stratospheric mechanism, which includes 46 chemical species, 90 thermal and 37 photochemical reactions. In addition, seven reactions on or within cold aerosols are included (PSCs or liquid sulfate aerosol). The numerical solver chosen for the benchmark calculation is a highly accurate implicit technique following the work of Gear (SMVGEARII, Jacobson, 1995). No lumping of chemical species to form "families" is assummed in the benchmark solution approach. Three dimensional integrations will be conducted for each chemical solution approach — with each chemical solution approach using the same thermal and photolytic rate constants derived within the GMI core model. The status of the comparisons between the benchmark chemical solution approach and the computationally efficient chemical solution approaches will be presented.

Jacobson, M. Z., Computation of global photochemistry with SMVGEARII, *Atm. Env.*, 29, 2541-2546, 1995.

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